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- 2.\*\*\* shows the word which can not be translated.
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**CLAIMS**

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[Claim(s)]

[Claim 1]A position sensing device being a thing characterized by comprising the following.

A magnetic body interlocked with analyte in which slide movement is free in a determined direction.  
An electric field generating element which possesses an electrode installed successively with a prescribed interval in the direction in which analyte carries out slide movement, and generates an electric field by this electrode.

A detection means to output a detection signal which detects a position which disorder produced in an electric field of said electric field generating element by magnetism of said magnetic body, and shows this position.

A calculating means which finds a position or a position, and speed of analyte based on this detection signal.

[Claim 2]The position sensing device according to claim 1, wherein a magnetic comb in which it comes to stand a magnetic body in a row stood in a row with said electric field generating element and is provided with a prescribed interval.

[Claim 3]The position sensing device according to claim 1 or 2, wherein said analyte is a shutter screen of a camera.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the position sensing device of analyte with which accuracy is required of operations, such as a position sensing device of the analyte which carries out slide movement, especially a shutter screen of a camera.

[0002]

[Description of the Prior Art]Right hand sides which carry out slide movement, such as a shutter screen and a read station of a recording medium, are provided in precision mechanical equipments, such as a camera, a computer, and a printer.

To control correctly the position and working speed of this right hand side is needed.

[0003]For example, if two or more point curtains 2 and rear curtains 3 in which shutter blades overlap are provided and a shutter release is pushed as shown in drawing 4 (a), the shutter screen 1 of a camera, The point curtain 2 carries out slide movement to down with constant speed first, and then the rear curtain 3 carries out slide movement of the point curtain 2 with constant speed later on (drawing 4 (b)). At this time, the gap S of prescribed width, i.e., a slit, produces between the shutter blade 2a of the back end of the point curtain 2, and the shutter blade 3a at the tip of the rear curtain 3. This slit S runs from a top with constant speed down with operation of the shutter screen 1 to Screen A which should be exposed, with the gap of prescribed width maintained, and if the shutter blade 3a at the tip of the rear curtain 3 reaches the lowermost end of Screen A, operation of the shutter screen 1 will complete it (drawing 4 (c)). An actuator, an arm, etc. of a shutter screen are omitted in drawing 4.

[0004]Since exposure of a camera is determined by shutter speed and diaphragm so that \*\*\*, shutter speed must be [ that a camera user's photographing intention should be reflected ] exact. Therefore, operation of said shutter screen 1 also needs to be controlled correctly and precisely.

[0005]

[Problem(s) to be Solved by the Invention]Although Screen A is exposed only for shutter speed (second) by said shutter screen 1, the shutter speed in said shutter screen 1 is determined with the difference of the attack time of the point curtain 2 and the rear curtain 3, i.e., the width of the slit S. Generally, although control of the width of this slit S is performed by controlling operation of the shutter screen 1 by set-up shutter speed electronically, This controls the difference of the attack time of the point curtain 2 and the rear curtain 3, and detects and controls the width of the actual slit S, nor the working

speed of the shutter screen 1.

[0006]Therefore, some difference may arise in the working speed of the shutter screen 1 by the mechanical characteristic of the actuator of a shutter screen, etc., and this difference, Since it becomes a difference of the speed the slit S runs to Screen A, in the shutter of all the cameras, Screen A is not necessarily correctly exposed with the set-up shutter speed. This is also the same as when the position and the speed of operation of the shutter screen 1 change with frequency in use or daily degradation from the state of the time of setting out.

[0007]If the shutter screen 1 may not operate normally and the abnormalities of the shutter screen 1 can be known in real time by a certain obstacle and failure in such a case, The camera user can interrupt subsequent photography promptly, and can fix a camera, or can take correspondence of continuing photography with another camera, and is convenient. [0008]Thus, in the camera which can detect neither the width of the actual slit S, nor working speed of a shutter screen. Shutter speed cannot detect that it is a different thing from an indicated value, but it as mentioned above, Even if it takes a photograph by the set-up exposure, it becomes what differs in actual exposure, and a camera user's photographing intention cannot be reflected correctly, but there is a problem that useless photography which is not the thing intended originally is carried out.

[0009]The mechanism (JP,4-110843,A) in which irradiate a shutter screen with an ultrasonic wave and the working speed or shutter speed of a shutter screen is detected that this problem should be solved further, What installed two or more detecting mechanisms by an ultrasonic wave side by side that it should correspond to an ultra high-speed shutter (JP,10-123639,A) is already devised by this invention person.

[0010]This invention is made that this problem should be solved from another viewpoint, and is a thing. It is providing a means the target position of analyte, especially the position of the shutter screen of a camera being correctly detectable with simple composition.

[0011]

[Means for Solving the Problem]A position sensing device concerning claim 1 of this invention made in order to attain said purpose, A magnetic body interlocked with analyte in which slide movement is free in a determined direction, and an electric field generating element which possesses an electrode installed successively with a prescribed interval in the direction in which analyte carries out slide movement, and generates an electric field by this electrode, A position which disorder produced in an electric field of said electric field generating element by magnetism of said magnetic body is detected, and it has a detection means to output a detection signal which shows this position, and a calculating means which finds a position or a position, and speed of analyte based on this detection signal.

[0012]In a position sensing device indicated to claim 1, with a prescribed interval, a magnetic comb in which it comes to stand a magnetic body in a row arranges this invention (claim 2) in parallel with said electric field generating element, and it is provided.

[0013]In a position sensing device with which this invention (claim 3) was indicated to claim 1 or 2, said analyte is a thing of a shutter screen of a camera.

[0014]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is concretely described based on a drawing. Although this invention is a figure showing the composition of the position sensing device 100 of the starting shutter screen, drawing 1 is characterized by the position sensing device 100 of this

shutter screen comprising the following, as shown in a figure.

The permanent magnet (magnetic body) 101 provided in the determined direction at the shutter screen 1 in which slide movement is free.

The electric field generating element 102 by which the electrodes 20 for generating an electric field were installed successively in the move direction of this shutter screen 1.

The magnetic comb 103 provided in the side of this electric field generating element 102.

A detection means 104 to output the detection signal which detects disorder of the electric field of said electric field generating element 102, and shows this position, and the calculating means 105 which finds the position and speed of the shutter screen 1 based on this detection signal.

[0015]The permanent magnet 101 is formed in the flank of the shutter blade 2a of the back end of the point curtain 2 of the shutter screen 1, and the flank of the shutter blade 3a at the tip of the rear curtain 3, respectively, as shown in [drawing 1](#). The shape or the size of the permanent magnet 101 will not be limited in particular, if the working speed of a shutter screen required for a high speed shutter, etc. do not spoil operation of the usual shutter screen remarkably, for example.

[0016]The electric field generating element 102 is formed in the side in which it is the side of the shutter screen 1 and said permanent magnet 101 was formed in parallel to the direction of slide movement of the shutter screen 1, as shown in [drawing 1](#). As the internal structure of the electric field generating element 102 is shown in [drawing 2](#), the insulating material 21 by which the electrode 20 was fixed to the inner surface side with the constant interval counters, The electrode pair arranged in the shape of a single tier is formed in the sliding direction of the shutter screen 1, this electrode pair is what was enclosed by the insulating material 21 with the rare gas 22, and an electric field is formed in the building envelope sealed by the insulating material 21 by carrying out the seal of approval of the voltage to this rare gas 22. The physical relationship of the electric field generating element 102 and said permanent magnet 101, The electrode 20 aims to stand in a row at a single tier in the direction in which the permanent magnet 101 carries out slide movement, and it will not be limited especially if the electric field produced in the building envelope of the electric field generating element 102 is a position within the limits influenced by the magnetism generated from the permanent magnet 101. Although not shown in a figure, each electrode pair 20 has structure electrically connected with the exterior.

[0017]As shown in [drawing 3](#), when the detailed permanent magnet (magnetic body) 30 is supported by the base material 31, a pectinate form comes to stand the magnetic comb 103 in a row with a prescribed interval, and it gives the magnetism emitted from said permanent magnet 101, and the magnetism to repel to said electric field generating element 102. Therefore, the physical relationship of said permanent magnet 101 and the magnetic comb 103 is arranged so that the magnetism generated from each may oppose to said electric field generating element 102.

[0018]The detection means 104 outputs the detection signal which shows the position which had disorder of an electric field in the electric field produced in the building envelope of said electric field generating element 102 based on the electrical signal of each electrode 20 at the time of disorder (change) occurring by the magnetism of said permanent magnet 101.

[0019]Even if the calculating means 105 calculates the position and speed of the point curtain 2 and the rear curtain 3 based on this detection signal and provides hardware for exclusive use as a calculating means, it may use the microcomputer carried in the camera.

[0020]Hereafter, operation of the position sensing device 100 of this shutter screen is explained. Voltage

is always given to the electrode 20 of the electric field generating element 102, and the fixed electric field is formed in the building envelope of this electrode 20. When each permanent magnet 30 of the magnetic comb 103 gives magnetism to this electric field generating element 102, in response to the influence of magnetism, change produces the electric field of the electric field generating element 102 in a constant interval. Change of this electric field is conceptualized as stress of a maxwell, and an electric charge, a magnetic pole, and the power of acting between current are mathematically expressed through the stress which exists in electromagnetic field. Thereby, as for the electric field of the electric field generating element 102, with the magnetic comb 103, a graduation becomes that by which marking was carried out, as was attached, and this marking can be read as an electrical signal.

[0021]When the shutter screen 1 operates, and the shutter blade 2a of the point curtain 2 or the shutter blade 3a of the rear curtain 3 specifically operates, this operation is interlocked with and each permanent magnet 101 carries out slide movement to the electric field generating element 102. The magnetism generated from the permanent magnet 101 affects the electric field of the electric field generating element 102, and disorder produces the electric field by which marking was carried out with the constant interval in the position nearest to the permanent magnet 101.

[0022]The detection means 103 reads disorder of this electric field as an electrical signal, and outputs the detection signal which shows a position with disorder of the electric field of the electric field generating element 102. The calculating means 104 calculates the working speed of point curtain 2 and rear curtain 3 each in response to this detection signal from the position of point curtain 2 and rear curtain 3 each, and the amount of position changes per unit time.

[0023]The width of the slit S of the shutter screen 1 can be computed from the position of point curtain 2 and rear curtain 3 each which was called for by the calculating means 104, and the actual exposure time of Screen A, i.e., actual shutter speed, can be found from the working speed of width [ of this slit S ], point curtain 2, and rear curtain 3 each. Computers, such as a computer, may be separately formed also as performing calculation of the width of the slit S, and shutter speed by a calculating means.

[0024]In this embodiment although the permanent magnet 101 is formed in both the point curtain 2 and the rear curtain 3, Since the actuator of the point curtain 2 and the rear curtain 3 is the same, the point curtain 2 and the rear curtain 3 operate at the same speed, The point curtain 2 is always fixed operation, and shutter speed from being determined with the difference at the time of the operation start of the rear curtain 3 to the point curtain 2. The permanent magnet 101 is formed only in the rear curtain 3, the position and working speed are detected, and it will ask for the position and working speed of the curtain 2 constructively in the future, and if it has composition which computes shutter speed, the position sensing device of a shutter screen can also be made into the thing of a simpler structure.

[0025]What [ was shown by this embodiment as an electric field generating element concerning this invention ]. For example, things which installed successively to the line the publicly known and arbitrary electrodes which generate an electric field, such as what controls each element of a plasma display, the variable condenser used for a tuned circuit, positive, or the electric charge which undertakes and is charged in one [ a gap or ] electrode (electrode which is not a pair) by a control circuit, can be used. An electrode does not necessarily need to be exposed and the surface may be covered with glass, an epoxy resin, etc.

[0026]The physical relationship of the permanent magnet 101 and the magnetic comb 103 is not limited to what was shown by this embodiment, and the magnetism of the permanent magnet 101 should just disturb the electric field of the electric field generating element 102 in which marking was carried out by

the magnetism of the magnetic comb 103. Therefore, even if it is the physical relationship that the magnetic comb 103 intervenes, for example between the permanent magnet 101 and the electric field generating element 102, If it may be the three-dimensional physical relationship that the permanent magnet 101, the electric field generating element 102, and the magnetic comb 103 serve as the equal distance, respectively and marking of the magnetic comb 103 is disturbed, the magnetism of the permanent magnet 101 and the magnetism of the magnetic comb 103 are amplified even if it opposes mutually -- it may be.

[0027]As for the position sensing device concerning this invention, it is natural that it is not used only for the detecting position of the shutter screen shown by this embodiment, and can use for detecting positions, such as a slide operation part of precision mechanical equipments, such as a computer and a printer.

[0028]

[Effect of the Invention]The magnetic body which is interlocked with the analyte in which slide movement is free in a determined direction according to the position sensing device concerning this invention as explained above, The electric field generating element which possesses the electrode installed successively with the prescribed interval in the direction in which analyte carries out slide movement, and generates an electric field by this electrode, A detection means to output the detection signal which detects the position which disorder produced in the electric field of said electric field generating element by the magnetism of said magnetic body, and shows this position, It has a calculating means which finds the position or the position, and speed of analyte based on this detection signal, and since, the position or the position, and working speed of analyte can be detected in real time. It is expectable that analyte can know correctly whether it is operating at the position set up beforehand and speed, maintains the accuracy of operation of analyte, and improves the reliability by this with a simple structure which does not spoil operation of analyte.

[0029]Since according to this invention the magnetic comb in which it comes to stand a magnetic body in a row stood in a row with said electric field generating element and was provided with the prescribed interval, By carrying out marking of the electric field of an electric field generating element to a constant interval by the magnetism of a magnetic comb, Even when the position of a permanent magnet can be detected more correctly and this electric field is influenced by the magnetism from other than a permanent magnet, it is expected that a detection value can be easily amended based on said marking.

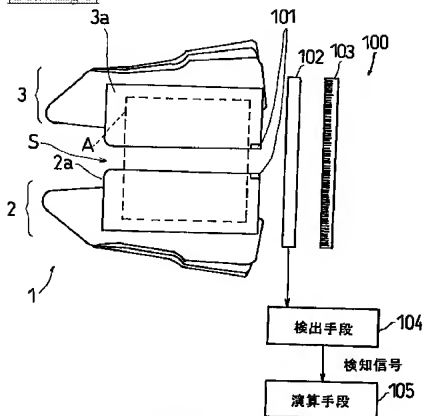
[0030]The position and working speed of a actual shutter screen are detectable by making analyte of this invention into the shutter screen of a camera, When the difference of a detection value and the value set up beforehand exceeds a predetermined threshold, by performing an error display etc., the accuracy of operation of a shutter screen can be maintained and it can expect to improve the reliability of a camera.

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[Translation done.]

## DRAWINGS

[Drawing 1]



100 シャッター幕の位置検出装置

101 永久磁石

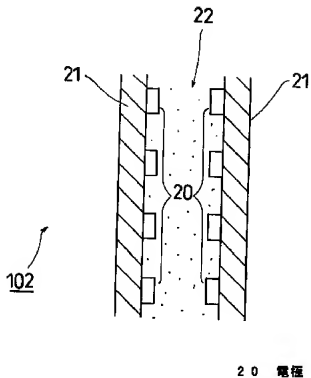
102 電界発生素子

103 磁気コアム

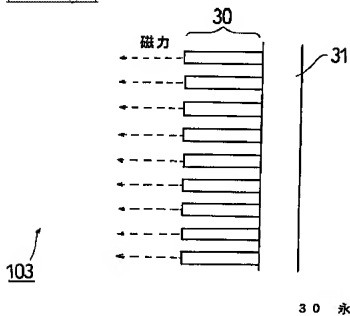
104 検出手段

105 演算手段

[Drawing 2]

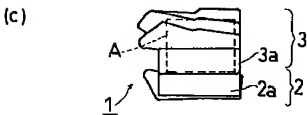
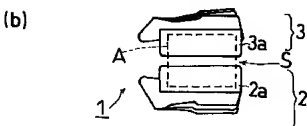
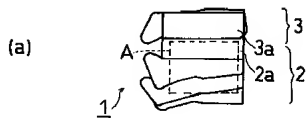


[Drawing 3]



[Drawing 4]





1 シャッター幕

[Translation done.]

# PATENT ABSTRACTS OF JAPAN

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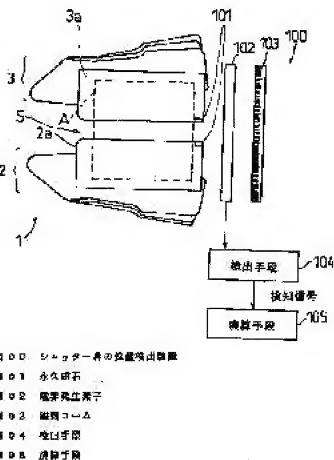
(51)Int.Cl. G01B 7/00  
G01D 5/12  
G01P 3/42  
G03B 9/36

(21)Application number : 2001-080047 (71) TAMURA HARUTO  
(22)Date of filing : 21.03.2001 (72)Inventor : TAMURA HARUTO

## (54) LOCATION DETECTING DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a means of a simple constitution capable of accurately detecting the location of a sliding and moving body to be inspected, especially the location of a shutter screen of a camera.  
**SOLUTION:** The device 100 for detecting the location of the shutter screen is provided with a permanent magnet (magnetic body) 101 provided for the shutter screen 1 which freely slides and moves in predetermined directions, a magnetic field generating element 102 in which electrodes 20 for generating a magnetic field are arranged in a row in the directions of movement of the shutter screen 1, a magnetic comb 103 provided for a side of the magnetic field generating element 102, a detecting means 104 for detecting disturbance of the magnetic field of the magnetic field generating means 102 and outputting a detection signal indicating the location, and an operating means 105 for obtaining the location and speed of the shutter screen 1 on the basis of the detection signal.



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G 0 1 D 5/12		G 0 1 D 5/12	M 2 F 0 7 7
			A 2 H 0 8 1
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(71) 出願人 S91197105

田村 晴人

(72) 発明者 田村 晴人

鳥取県岩美郡岩美町岩井311番地

(74) 代理人 J00050182

弁理士 渡辺 三彦

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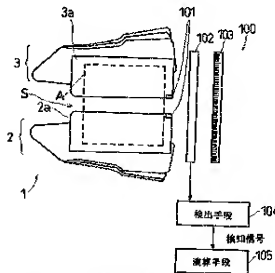
2H081 AA19 AA23 AA29

(57) 【発明の名称】 位置検出装置

(57) 【要約】

【課題】 スライド移動する被検体の位置、特にカメラのシャッター幕の位置の検出を、簡易な構成で正確に行うことができる手段を提供する。

【解決手段】 本シャッター幕の位置検出装置 100 は、所定方向にスライド移動自在なシャッター幕 1 に設けられた永久磁石 (磁体) 101 と、磁界を発生させるための巻線 20 が該シャッター幕 1 の移動方向に列設された磁界発生素子 102 と、該磁界発生素子 102 の側方に設けられた磁気コーム 103 と、前記磁界発生素子 102 の磁界の乱れを検出し、該位置を示す検知信号を出力する検出手段 104 と、該検知信号に基づいてシャッター幕 1 の位置及び速度を求める演算手段 105 とを備えてなるものである。



100 シャッター幕の位置検出装置

101 永久磁石

102 磁界発生素子

103

1 0 1 永久磁石  
1 0 2 電界誘起変子  
1 0 3 磁気2-Δ  
1 0 4 塊晶手紋  
1 0 5 液晶手紋